

# Design of the Way of Upgrading Comprehensive Energy Service for Power Grid Enterprises

Wei Tang<sup>1,\*</sup>, Baoguo Shan<sup>1</sup>, Jianming Yu<sup>2</sup> and Changli Liu<sup>3</sup>

<sup>1</sup>State Grid Energy Research Institute Co., Ltd., Beijing, China

<sup>2</sup>Beijing Kedong Electric Power Control System Co., Ltd., Beijing, China

<sup>3</sup>North China Electric Power University, Beijing, China

\*Corresponding author

**Abstract**—This paper analyses the integrated energy service from the service point of view, combs the service content, typical service process and so on, and puts forward optimization suggestions. Aiming at the problem of differentiation, this paper puts forward differentiated service strategy and differentiated guarantee mechanism according to different formats.

**Keywords**—integrated energy services; path; promotion

## I. INTRODUCTION

With the reform of energy system and the development of technology, new features have emerged in the form of energy services. Integrated energy services have become the focus of attention from all walks of life. Integrated energy services have become the key to implementing the national energy strategy and promoting structural reform of energy supply side. It is important to develop integrated energy services.

Integrated energy services are aimed at the comprehensive energy demand of customers, jointly providing different types of energy services, or providing customers with targeted distributed energy, energy conservation, emission reduction, and demand response energy services. Integrated energy services involve more internal business departments of the grid. The main demand of customers for similar services is less running and shorter deadlines.

At present, the research on integrated energy services mainly focuses on market potential and technology. For example, references [1,2] focus on related technologies, while references [3,4] focus on business models. There are few literatures on comprehensive energy services from the service point of view. Most of the service research is limited to power supply services, but not to integrated energy services. There are many studies like references [5].

Since grid enterprises have established integrated energy service companies in various provinces, the development of integrated energy projects has entered the daily track, it is necessary to conduct in-depth research on how to improve integrated energy services. "Integrated energy services" need to be market-oriented, customer-centered, form agile and flexible market response mechanism, establish market operation mechanism; customer experience-centered, process management and control as a means to form lean and accurate customer and product management methods; according to the

actual situation of various regions, form a differentiated development model.

## II. TYPES OF INTEGRATED ENERGY SERVICES

Generally speaking, the types of integrated energy services can be divided into the following six categories.

TABLE I. TYPES OF INTEGRATED ENERGY SERVICES

Service Type	Service Content
Energy supply services	power supply, gas supply, heating, water supply, hydrogen supply and other energy sources.
Technical equipment services	smart microgrid, energy storage, Internet of Things and other technical equipment.
Management services	provide energy solutions using big data and cloud computing.
Engineering services	energy planning and design, engineering construction, multi-energy operation and maintenance, transformation, etc.
Investment and financing services	BOT mode, BOO mode, PPP mode, BT mode, etc.
Value-added services	include distributed energy services, demand side management services, smart home, energy efficiency assessment, electric vehicles, equipment health assessment, multi-table collection, payment services, store services, etc.

At present, power grid enterprises have carried out relevant pilot practices for these six types of services and accumulated some experience. However, there are still some problems in customer experience, and it is urgent to improve the service level.

## III. SPECIFIC OPERATION PROCESS OF INTEGRATED ENERGY SERVICES

At present, the integrated energy service project is led by the marketing department. The project service process of engineering class is the most complex. The figure below shows the most complex process.

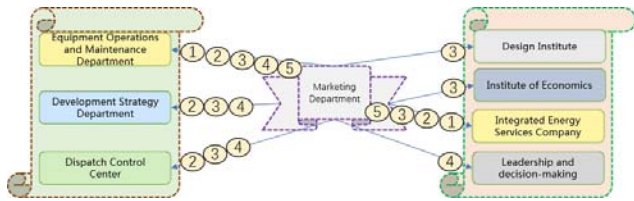


FIGURE I. DEPARTMENTS AND COLLABORATIVE RELATIONSHIPS INVOLVED IN INTEGRATED ENERGY SERVICES

①Project Reserve: Marketing department, Operational Inspection department and Integrated Energy Company are responsible for project reserve.

② Survey and scheme determination: joint survey and scheme determination of marketing department, operation and inspection department, Development Planning department, Dispatch department and comprehensive energy company.

③ Research and evaluation: design institute, Research Institute and comprehensive energy company complete research and evaluation, marketing department, transportation inspection department, Development Planning department, and Dispatch department complete evaluation.

④Project decision-making: the leaders of prefectural and municipal companies and the heads of marketing, operation and inspection, development and dispatch departments make investment decisions on large-scale integrated energy projects.

⑤ Project implementation: Integrated Energy Company is responsible for project implementation, marketing department, transportation and inspection departments cooperate.

In view of the above process, combined with customer experience, we need to improve the operation mechanism. Integrated energy services are divided into three stages: pre-sale, mid-sale and after-sale. These three stages integrate online and offline resources and work flexibly in the situation of platform and entity.

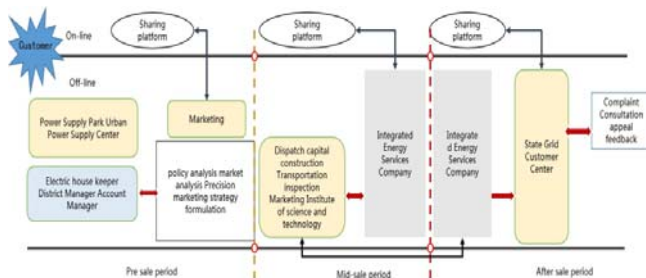


FIGURE II. OVERVIEW OF ALL STAGES OF INTEGRATED ENERGY SERVICES BUSINESS

An important task in the pre-sale stage of integrated energy services is to master demand, create demand and guide demand. Marketing department and customer service center carry out market and policy analysis, interact with front-end information, use data analysis and mining results, and carry out planning and promotion work.



FIGURE III. DEMAND-ORIENTED BUSINESS PROCESS OF INTEGRATED ENERGY SERVICES

The overall optimization measures are as follows:

a. Integrate the decision-making of integrated energy projects into the market and customer committee's decision-making, increase the coordination of various departments, and ensure the profitability and smooth implementation of the project.

b. Enhancing the organizational vitality of integrated energy companies, conducting pilot reform of mixed ownership, introducing high-quality strategic partners, and enhancing competitiveness.

c. To cultivate the leading-edge professionals needed by the introduction of integrated energy services and other businesses, and to establish a flexible market-oriented talent incentive mechanism.

d. Increase the access of legal professionals to project decision-making and contract signing and other implementation links, develop new business such as comprehensive energy according to law and regulations, and guard against legal risks.

e. Speed up the construction of intelligent infrastructure, improve the level of intelligent infrastructure equipment, and fully realize the real-time interaction and sharing of data. Based on the development of value-added services for smart meters, smart meters can provide data support for power quality management and high-quality power supply services. Marketing and other specialties can analyze customer behavior characteristics, innovate service strategies and products through smart meter data.

#### IV. DIFFERENTIATED DEVELOPMENT PATH

Due to the different regional conditions and different business development trends, we should fully consider the common and individual characteristics of different regions, make full classification of types, implement differentiated layout, develop strengths and avoid weaknesses, take market development as the first priority, integrate service resources, implement differentiated market expansion and customer service strategy, and further enhance market competitiveness and customer service level.

TABLE II. DIFFERENTIATED DEVELOPMENT MODEL OF INTEGRATED ENERGY SERVICES

Type	Development mode
Load-intensive areas	With the rapid growth of electricity demand and the rapid transformation of consumption patterns in load-intensive areas, the possibility of the application of distributed energy is the greatest. The integrated energy service focuses on the diversified and complex development modes such as distributed power management service, smart home service, network transaction service and demand side management service.
Power intensive areas	Consider services such as early warning and monitoring of natural disasters . For environmental pollution pressure , increase energy saving and consumption reduction services . For areas with more wind and solar energy , the characteristics and potential valued of near-source users should be tapped to stimulate the potential for users.
Different user types	According to the classification of user types , it is necessary to dig deep into users , subdivide market demand , distinguish high-value customer groups , sub-value customer groups and potential value customer groups , study visual interface display of different needs and develop corresponding value-added services .

#### V. DIFFERENTIATION GUARANTEE MECHANISM

The landing of differentiated development mode needs differentiated guarantee mechanism. We summarize the following mechanisms that need to be implemented.

a. In the process of the development of new business such as integrated energy services, limited by immature business model, too little experience, lack of technology and customer communication, it is necessary to adopt a differentiated assessment mechanism, which only assesses the overall scale or profitability indicators, allows the project to fail, and encourages new business companies to actively explore within a certain limit.

b. Strengthen the construction of highly adaptable contingents, improve the high matching, high recognition and high growth of talents in different positions, and improve the quality and stability of contingents.

c. We should build a unified service platform, integrate technologies such as big data, Internet of Things, cloud computing, artificial intelligence and core business, build a unified data center, and pay attention to data accuracy, consistency and openness. Using artificial intelligence, big data and other technologies to mine customer data value, find potential applications, create a "digital ecological community", closely intertwined with customer needs, advocate the concept of symbiosis and win-win service.

d. Project implementation is carried out in the form of project responsibility system. In the whole process of project implementation, project managers integrate resources, extract professional strength, flexibly build teams according to the actual process, take the actual completion of the project as the assessment content, and give evaluation and reward and punishment to project team members according to the assessment results.

#### REFERENCES

- [1] Discussion on Mixed Simulation Technology Route of Integrated Energy System [J]. Ma Kaiqi, Wu Di, Zheng Hao. Power Supply and Consumption. 2018 (07)
- [2] Distribution network planning research under the background of integrated energy [J]. Zhang Lili, Dou Xun, Wang Jun, Zhang Pan. Power supply and consumption. 2018 (04)
- [3] Development status and business model of integrated energy services at home and abroad [J]. Fenghongli. Electrical industry. 2017 (06)
- [4] Research on the Business Model of Integrated Energy Services for Power Grid Enterprises under the Background of New Electricity Reform [J]. Huang Jianping, Yu Jing, Chen Meng, Zhao Weibo, Wang Siyu. Electricity and Energy. 2018 (03)
- [5] Liu Dongliang. Management Innovation of High Efficiency Integration of Service End Grid [J]. Agricultural Power Management, 2018 (12): 25.